

Appl. No. 10/702,181
Amendt. dated September 9, 2005
Reply to Office Action of May 11, 2005

Amendment to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Please cancel claims 10 and 11

Claim 1 (currently amended): A performance enhancing break-in method for a proton exchange membrane fuel cell (12), the fuel cell including an anode electrode (14) and a cathode electrode (16) secured to opposed sides of a proton exchange membrane electrolyte (18), the method comprising the steps of:

- a. cycling a potential of an electrode selected from the group consisting of the anode electrode (14) and the cathode electrode (16) for a first electrode cycle by changing the potential of the selected electrode (14, 16) within a potential range of between 0.00 volts to 1.20 volts from a first potential within the range to a second potential within the range and then changing the potential of the selected electrode (14, 16) from the second potential back to the first potential while exposing the selected electrode (14, 16) to an inert gas and while exposing the non-selected electrode (14, 16) to a gas selected from the group consisting of a hydrogen containing gas, a reducing fluid reactant, and a mixture of a reducing fluid and an inert gas; and,

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- b. repeating the cycling of the potential of the selected electrode (14, 16) for at least a second electrode cycle.

Claim 2 (original): The method of claim 1, further comprising the step of cycling the potential of the selected electrode (14, 16) by applying a direct electrical current to the electrode (14, 16) from a programmable direct current power source (80) to
5 change the potential of the electrode (14, 16) from the first potential to the second potential, and then changing the potential of the electrode (14, 16) back to the first potential.

Claim 3 (currently amended): The method of claim 1, further comprising the steps of selecting the cathode electrode (16) from the group of electrodes, cycling the potential of the cathode electrode (16) by lowering the potential of the cathode
5 electrode (16) within the potential range by first exposing the cathode electrode (16) to ~~an~~ the inert gas while exposing the anode electrode (14) to ~~a~~ the reducing fluid reactant, and then raising the potential of the cathode electrode (16) within the potential range by exposing the cathode electrode (16) to an
10 oxidant reactant while continuing to expose the anode electrode (14) to the reducing fluid reactant.

Claim 4 (currently amended): The method of claim 1, further comprising the steps of selecting the anode electrode (14) from the group of electrodes, cycling the potential of the anode electrode (14) by lowering the potential of the anode electrode
5 (14) within the potential range by first exposing the anode electrode (14) to ~~a reducing fluid reactant~~ the inert gas while

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exposing the cathode electrode (16) to ~~an oxidant~~ the reducing
fluid reactant, and then raising the potential of the anode
electrode (14) within the potential range by exposing the anode
10 electrode (16) to an ~~inert gas~~ oxidant reactant while continuing
to expose the cathode electrode (16) to the ~~oxidant~~ reducing
fluid reactant.

Claim 5 (currently amended): A performance enhancing break-in
method for a proton exchange membrane fuel cell (12), the fuel
cell including an anode electrode (14) and a cathode electrode
(16) secured to opposed sides of a proton exchange membrane
5 electrolyte (18), the method comprising the steps of:

- a. cycling a potential of the cathode electrode (16) for
a first cathode cycle by changing the potential of the
cathode electrode (16) within a potential range of
between 0.00 volts to 1.20 volts from a first cathode
10 potential within the range to a second cathode
potential within the range and then changing the
potential of the cathode electrode (16) from the
second cathode potential back to the first cathode
potential while exposing the cathode electrode (16) to
15 an inert gas and while exposing the anode electrode
(14) to a gas selected from the group consisting of a
hydrogen containing gas, a reducing fluid reactant,
and a mixture of a reducing fluid and an inert gas;
- b. repeating the cycling of the potential of the cathode
20 electrode (16) for at least a second cathode cycle;
- c. cycling a potential of the anode electrode (14) for a
first anode cycle by changing the potential of the
anode electrode (14) from a first anode potential

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25 within the potential range of between 0.00 volts to
 1.20 volts to a second anode potential within the
 range and then changing the potential of the anode
 electrode (14) from the second anode potential back to
 the first anode potential while exposing the anode
30 electrode (14) to an inert gas and while exposing the
 cathode electrode (16) to a gas selected from the
 group consisting of a hydrogen containing gas, a
 reducing fluid reactant, and a mixture of a reducing
 fluid and an inert gas; and,
 d. repeating the cycling of the potential of the anode
35 electrode (14) for at least a second anode cycle.

Claim 6 (original) The method of claim 5, comprising the
further steps of cycling the potential of the cathode electrode
(16) by applying a direct electrical current to the cathode
electrode (16) from a programmable direct current power source
5 (80) to change the potential of the cathode electrode (16) from
the first potential to the second potential, and then to change
the potential of the cathode electrode (16) back to the first
potential, and cycling the potential of the anode electrode (14)
by applying a direct electrical current to the anode electrode
10 (14) from the programmable direct current power source (80) to
change the potential of the anode electrode (14) from the first
potential to the second potential, and then to change the
potential of the electrode (14) back to the first potential.

Claim 7 (currently amended): The method of claim 5 further
comprising the steps of cycling the potential of the cathode
electrode (16) by lowering the potential of the cathode

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electrode (16) within the potential range by first exposing the
5 cathode electrode (16) to ~~an~~ the inert gas while exposing the
anode electrode (14) to a the reducing fluid reactant, and then
raising the potential of the cathode electrode (16) within the
potential range by exposing the cathode electrode (16) to an
oxidant reactant while continuing to expose the anode electrode
10 (14) to the reducing fluid reactant.

Claim 8 (currently amended): The method of claim 5, further
comprising the steps of cycling the potential of the anode
electrode (14) by lowering the potential of the anode electrode
(14) within the potential range by first exposing the anode
5 electrode (14) to a the ~~reducing fluid reactant~~ inert gas while
exposing the cathode electrode (16) to ~~an oxidant~~ the reducing
fluid reactant, and then raising the potential of the anode
electrode (14) within the potential range by exposing the anode
electrode (16) to an ~~inert gas~~ oxidant reactant while continuing
10 to expose the cathode electrode (16) to the ~~oxidant~~ reducing
fluid reactant.

Claim 9 (currently amended): The method of claim 5, further
comprising the steps of, after the cycling the potential of the
cathode electrode (16) step and the cycling the potential of the
anode electrode (14) step, calibrating performance of the fuel
5 cell (12) by a performance calibration step by exposing the
anode electrode (14) to a the reducing fluid reactant and
exposing the cathode electrode (16) to an oxidant reactant, then
closing a primary load switch (78) to connect a primary load
(74) to the anode and cathode electrodes (14, 16) for a
10 predetermined duration, then opening the primary load switch

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(78) after the duration, and then repeating the performance calibration step a predetermined number of repetitions.

Claim 10 (canceled)

Claim 11 (canceled)